WHAT IS CLAIMED IS:

1. A method for determining the probability of a patient burn under a return electrode in a monopolar electrosurgical system comprising:

    calculating a heating factor adjacent the return electrode utilizing a first algorithm;

    calculating a cooling factor adjacent the return electrode utilizing a second algorithm;

    subtracting the calculated cooling factor from the calculated heating factor to obtain a difference value;

    comparing the difference value to a threshold value; and

    adjusting the power dependent on the relationship of the difference value to the threshold value.

2. The method of claim 1, wherein the step of calculating the cooling factor comprises the steps of calculating the off time of the output current to obtain an off time value and multiplying the off time value by a first constant indicative by the body's ability to remove heat.

3. The method of claim 2, wherein the step of calculating the heating factor comprises the steps of multiplying the square of the output current by a second constant indicative of the measured impedance at the return electrode.

4. The method of claim 3, wherein the second constant is representative of the adherence of the return electrode to the patient.

5. The method of claim 1, wherein the step of calculating the heating factor further comprises the steps of measuring the output current to obtain a first value and squaring the first value to obtain a squared current value.

6. The method of claim 5, wherein the step of calculating the heating factor further comprises the steps of calculating the on time of the output current to obtain an on time value and multiplying the on time value by the squared current value to obtain a second value.

7. The method of claim 6, wherein the step of calculating the heating factor further comprises the step of measuring the impedance at the return electrode and multiplying the impedance value by the second value.

8. The method of claim 1, further comprising the step of generating an alarm if the difference value exceeds the threshold value.

9. The method of claim 1, wherein the step of adjusting the power includes the step of shutting off the power if the difference value exceeds a predetermined value and lowering the power if the difference value is below the predetermined value.

10. The method of claim 9, further comprising the step of generating an alarm if the difference value exceeds the threshold value.

11. A method for determining the probability of a patient burn in a monopolar electrosurgical system comprising:

calculating a heating factor adjacent the return electrode utilizing a first algorithm;

calculating a cooling factor adjacent the return electrode utilizing a second algorithm;

subtracting the calculated cooling factor from the calculated heating factor to obtain a difference value;

comparing the second value to a threshold value; and

generating a warning signal if the difference value exceeds the threshold value.

12. The method of claim 11, wherein the step of calculating the heating factor includes the step of multiplying a current value by a constant indicative of the measured impedance at the return electrode.

13. The method of claim 12, wherein the current value is obtained by squaring the measured output current.

14. The method of claim 11, wherein the first algorithm includes multiplying a current value by the on time of the output current.

15. The method of claim 14, wherein the first algorithm includes multiplying the off time of the output current by a constant indicative of the ability of the body to remove heat.

Sub A1

16. An electrosurgical generator for use in a monopolar electrosurgical system having an electrosurgical tool for treating tissue, a return electrode, and an impedance sensor in electrical communication with the return electrode to measure impedance of the return electrode, the electrosurgical generator comprising:

a current sensor for measuring the output current delivered by the generator;

a microprocessor electrically connected to the current sensor and the impedance sensor for calculating the heating factor and cooling factor under the return electrode, the calculation of the heating factor being based at least in part on the measured output current; and

a controller electrically connected to the microprocessor for adjusting the power supply of the generator in response to the relationship of the calculated heating and cooling factors.

2 ~~17~~. The generator of claim 1 ~~16~~, wherein the microprocessor includes a first algorithm for calculating the heating factor and a second algorithm for calculating the cooling factor.

Sub A2

18. The generator of claim 17, wherein the first algorithm is defined as

$$K_c I^2 t_{on}$$

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wherein K_c is the constant representative of the measured impedance in Ohms of the return electrode, I^2 is the square of the output current in milliamps and t_{on} is the time in seconds that the output current is delivered.

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19. The generator of claim 18, wherein the second algorithm is defined as

$K_h\ t_{off}$

wherein K_h is the constant representative of the time it takes for the body to cool down in degrees per minute and t_{off} is the time in seconds that the output current is not being delivered.

20. The generator of claim 18, wherein the measured impedance is indicative of the degree of adherence to the patient of the return electrode.

21. The electrosurgical generator of claim 16, wherein the microprocessor includes an algorithm for subtracting the cooling factor from the heating factor to calculate a difference value, and the generator further comprises a comparator electrically connected to the microprocessor for comparing the difference value to a threshold value, the comparator being electrically connected to the controller to generate a first signal indicative of the relationship of the difference value and the predetermined value.

~~22~~ 7. The electrosurgical generator of claim ~~21~~ 4, further comprising an alarm electrically connected to the comparator for generating a warning signal if the difference value exceeds the threshold value by a predetermined amount.

Sub a3

23. The electrosurgical generator of claim 22, wherein the controller generates a shut off signal to terminate power if the difference value exceeds a predetermined value, the predetermined value being greater than the threshold value.

~~24~~ 9. The electrosurgical generator of claim ~~23~~ 8, wherein the controller generates a second signal to reduce the power if the difference value exceeds the threshold value but does not exceed the predetermined value.

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